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Health and Safety Plan: Rocky Flats Background Soils Characterization for Rocky Flats Plant

In Compliance with
DOE order 5400.1

DOCUMENT CLASSIFICATION
REVIEW WAIVER PER
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HEALTH AND SAFETY PLAN:

**Rocky Flats
Background Soils
Characterization**

**U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado**

ENVIRONMENTAL RESTORATION PROGRAM

May 1994

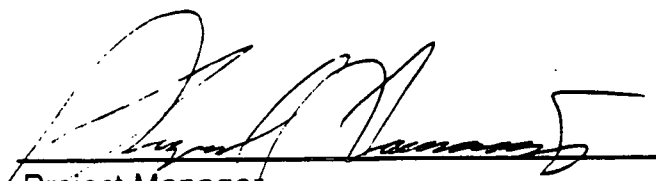
Health and Safety Plan:
Rocky Flats Background Soils Characterization

Approved By:



OU2 CLOSURE PROGRAM MANAGER

7/14/94
Date



Project Manager

7/14/94
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HEALTH AND SAFETY PLAN

REVIEW AND APPROVAL

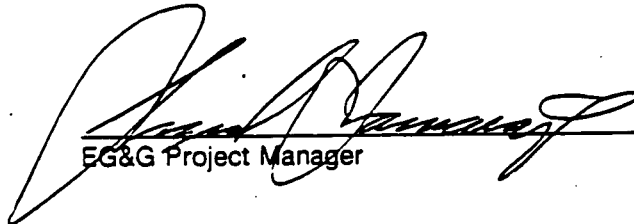
The following signatures document that this Project Health and Safety Plan (HASP) has been reviewed and approved by appropriate Departments and the applicable federal, state, and local regulations and RFP policies and practices have been incorporated.

Health and Safety Plan Title

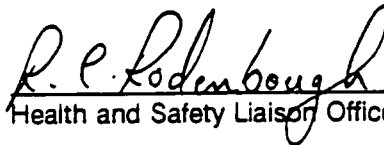
Health and Safety Plan Rocky Flats Background Soils Characterization

This site specific health and safety plan has been written for the use of Dames and Moore, its employees and subcontractors. All EG&G personnel associated with this Project will comply with RFP applicable aspects of the plan.

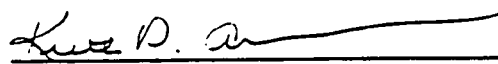
REVIEW AND APPROVAL

 7/6/94

EG&G Project Manager Date

 7/6/94

Health and Safety Liaison Officer Date

 7/6/94

Environmental Restoration Health and Safety Officer Date

HEALTH AND SAFETY PLAN
ROCKY FLATS
BACKGROUND SOILS CHARACTERIZATION

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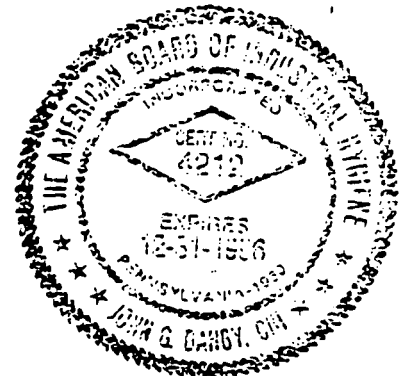
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This Health and Safety Plan is valid only for this specific project as described in Section 3.0. It is not to be used for other projects or subsequent phases of this project without the written approval of the Division Health and Safety Manager.

ROCKY FLATS PLANT

Manual No.:

RFP/ERM-94-00023

Section No.

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CHARACTERIZATION

Effective Date:

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Organization: Environmental Restoration Mgmt

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JUNE 11, 1991

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EXECUTIVE SUMMARY

The Rocky Flats Plant is currently under evaluation to assess impacts from historical operations and determine future environmental management and restoration stratagem. The Background Soils Characterization Project is to support that evaluation process by collecting data relative to background concentrations of specific contaminants of concern associated with the plant.

Dames & Moore is tasked with the study, which is specifically designed to avoid areas potentially impacted by the Rocky Flats operations, and thus will be conducted in areas well away from possible contamination. Although the scope of this work does not fall under the Occupational Safety and Health Administration (OSHA) standard governing Hazardous Waste Site Operations and Emergency Response (29 CFR 1910.120; a.k.a. -HAZWOPER), this health and safety plan (HASP) has been developed to address some of the basic safety considerations associated with the work involved, and to comply with applicable provisions of Department of Energy Safety Orders 5480 and OSHA regulations at 29 CFR 1926 and 29 CFR 1910. Basic safety guidelines and standard operating procedures are included for trenching, work around heavy equipment, lifting hazards, and walking/working surfaces.

1.0 SUMMARY AND APPLICABILITY

Dames & Moore is tasked with a study to characterize "background" levels of contaminants of concern associated with the Rocky Flats Plant, located nine miles north of Golden, Colorado. The study is specifically designed to avoid areas potentially impacted by the Rocky Flats operations, and thus will be conducted in areas well away from possible contamination. Some of the tasks will be conducted miles away at various locations along the Front Range (Colorado Springs to Fort Collins). Consequently, the scope of this work does not fall under the Occupational Safety and Health Administration (OSHA) standard governing Hazardous Waste Site Operations and Emergency Response (29 CFR 1910.120; a.k.a. - HAZWOPER). Nonetheless, this health and safety plan (HASP) has been developed to address some of the basic safety considerations associated with the work involved, and to comply with applicable provisions of Department of Energy Safety Orders 5480 and OSHA regulations at 29 CFR 1926 and 29 CFR 1910. Basic safety guidelines and standard operating procedures are included for trenching, work around heavy equipment, lifting hazards, and walking/working surfaces.

The provisions of the plan are mandatory for all onsite employees engaged in field activities associated with this project which may involve health and safety hazards.

Changing and/or unanticipated site conditions may require modification of this site safety plan in order to maintain a safe and healthful work environment. Any proposed changes to this plan should be reviewed with the Dames & Moore Division Health and Safety Manager, or his designee, prior to their implementation. EG&G requires that all revisions to the HASP be reviewed and approved by the EG&G Project Manager, the Environmental Restoration Health and Safety Officer, and the Health and Safety Liaison Officer.

Dames & Moore is providing a copy of this Health and Safety Plan (HASP) to each site subcontractor in order to fulfill its obligation under 29 CFR 1910.1200 (OSHA Hazard Communication Standard) and to inform subcontractors of site hazards. Each Dames & Moore subcontractor is bound by contractual agreement for the responsibility of the health and safety of their employees relative to their activities and this project even though they are to work under the provisions and requirements of this HASP.

2.0 FACILITY BACKGROUND/WORK PLAN

2.1 SITE HISTORY

The Rocky Flats Plant is located approximately 9 miles north of Golden, Colorado. Until recently, the primary mission of the plant has been the production of components for nuclear weapons. The plant is currently under evaluation to assess impacts from historical operations and determine future environmental management and restoration stratagem. This project is to support that evaluation process by collecting data relative to background concentrations of specific contaminants of concern associated with the plant.

2.2 PURPOSE AND SCOPE OF WORK

Three sampling programs have been specified to conduct the project-at-hand:

- 1) Approximately 50 surface soil samples will be collected at offsite locations along the Colorado Front Range similar in topography and precipitation to the Rocky Flats Plant site. Samples will be analyzed for plutonium content.
- 2) Approximately 30 surface soil samples will be collected in the security buffer zone on the west side of the Plant, and offsite to the north-northeast of the Plant. The samples will be collected well away from any areas of known contamination and will be analyzed for certain metals and organics.
- 3) Approximately 5 - 10 trenches will be excavated to a depth not to exceed four feet in the security buffer zone of the plant, on the western side, well away from any areas of known contamination. The trenches will be entered to visually classify the soils and collect samples for chemical and physical analysis.

The sample location maps from the workplan are located on the pages following this section.

The objective of this study is to obtain data representative of the background environment. The locations of the work will be selected specifically because they are suspected of containing no chemical or radiological contaminants above background. Pre-screening measures (for radioactivity) will be conducted in the areas to field-verify their cleanliness prior to collection of samples.

3.0 RESPONSIBILITIES

The provisions of this site safety and health plan along with the applicable regulations issued by governmental entities will be strictly adhered to by Site personnel and visitors. Each contractor is to conduct work in accordance with the provisions of this HASP and will be held accountable for the safe and healthful performance of work by each of their employees, subcontractors, or support personnel who may enter the site.

3.1 PROJECT MANAGER

The Project Manager (PM) shall direct onsite operations. The PM may delegate all or part of these duties to a properly-qualified employee who is designated as the Site Manager. At the site the PM, assisted by the Site Safety Officer (SSO), has primary responsibility for:

1. Seeing that appropriate personal protective equipment and monitoring equipment is available and properly utilized by all onsite personnel;
2. Establishing that site personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies;
3. Seeing that site personnel are aware of the potential hazards associated with site operations;
5. Monitoring the safety performance of all site personnel to see that the required work practices are employed;
6. Correcting any work practices or conditions that may result in injury or exposure to hazards;
7. Preparing any accident/incident reports for site activities (see Section 9.0);

8. Seeing to the completion of Plan Acceptance forms by site personnel (See Attachments);
9. Halting site operations, if necessary, in the event of an emergency or to correct unsafe work practices; and
10. Reviewing and approving this project health and safety plan.

3.2 SITE SAFETY OFFICER

The Site Safety Officer's (SSO) duties may be carried out by the PM or other site manager. The SSO:

1. Implements project Health and Safety Plans, and reports any deviations from the anticipated conditions described in the plan to the PM and, if necessary, the DHSM.
2. Determines that monitoring equipment is used properly by site personnel and is calibrated in accordance with manufacturer's instructions or other standards, and that results are properly recorded and filed.
3. Assumes any other duties as directed by the PM or DHSM.
4. Conducts daily safety meetings and completes the Site Safety Briefing Report (see Attachments).
5. Halts site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
6. Reviews and approves this project health and safety plan.
7. Identifies the hospital and route nearest to each of the sampling locations prior to engaging in field activities.

3.3 WESTERN DIVISION HEALTH AND SAFETY MANAGER (Dames & Moore)

The Western Division Health and Safety Manager (DHSM) shall:

1. Determine the need for periodic audits of the operation to evaluate compliance with this plan.
2. Provide health and safety support as requested by the SSO and PM.

3.4 PROJECT PERSONNEL

Project personnel involved in onsite investigations and operations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.
2. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSO or PM.
3. Implementing the procedures set forth in the Health and Safety Plan, and reporting any deviations from the procedures described in the Plan to the SSO or PM for action.
4. Reviewing project health and safety plan and signing acceptance form.

3.5 RADIOLOGICAL MONITORING SPECIALIST

Prescreening of soils in the Plant Buffer Zone for radioactivity prior to sampling must be conducted by an individual who is approved by EG&G Radiological Engineering.

3.6 SUBCONTRACTOR'S SAFETY REPRESENTATIVE

Subcontractors working for Dames & Moore will observe the health and safety criteria set forth in this HSP. Dames & Moore is responsible for seeing that their subcontractors observe the provisions of this HSP. To this end, each subcontractor is required to designate a Subcontractor's Safety Representative (SSR), who typically is the subcontractor supervisor. The SSR is responsible for the safe and healthful performance of work by his work force and subcontractors. During the subcontractor's activities onsite, the SSR will perform continuing work area inspections, and conduct safety meetings and safety orientations for all of their new employees. The SSR will attend periodic safety meetings with the SSO. The SSR will also investigate accidents and overexposures involving subcontractor personnel. Each SSR is responsible for:

- Establishing that their onsite personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies;
- Seeing that their onsite personnel are aware of the potential hazards associated with site operations;
- Monitoring the safety performance of their onsite personnel to see that the required work practices are employed;
- Correcting any work practices or conditions that may result in injury or exposure to hazardous substances;
- Preparing any accident/incident reports for their activities (see Section 7.4;
- Seeing to the completion of Plan Acceptance forms by their onsite personnel (See Attachment A);
- Halting their site operations, if necessary, in the event of an emergency or to correct unsafe work practices; and
- Reviewing and complying with this Site Safety and Health Plan.

4.0 JOB HAZARD ANALYSIS

The objective of this study is to obtain data representative of the background environment. The locations of the work will be selected specifically because they are suspected of containing no chemical or radiological contaminants above background. Pre-screening measures will be conducted in the areas to field-verify their cleanliness prior to collection of samples. The only chemical hazards anticipated with this project involve those associated with the chemicals brought on site to conduct the work. Refer to Section 4.8 for information concerning these.

Physical hazards at this work site include those associated with:

- noise hazards associated with the operation of heavy equipment;
- slip-trip-fall type of accidents;
- trenches/excavations
- injuries due to improper lifting;
- being caught in or struck by moving equipment;
- electrocution or explosion hazards associated with drilling or excavation activities, such as contact with overhead or underground power lines or pipelines.
- heat stress
- natural hazards such as severe storms and biological hazards

4.1 NOISE HAZARDS

The primary noise hazard at this site is from the excavating equipment. Previous surveys indicate that such equipment may produce noise at or above the action level of 85 dBA. All site personnel within 25 feet of operating equipment shall wear hearing protective devices (either muffs or plugs). All D&M personnel are in the Dames & Moore Hearing Conservation Program and have had baseline and, where appropriate, annual audiograms. Personnel will wash their hands with soap and water prior to inserting ear plugs to avoid initiating ear infections.

4.2 WALKING AND WORKING SURFACES

Workers should exercise caution when walking around the site to avoid fall and trip hazards. If holes or uneven terrain are located in the work area which could cause site personnel to fall or trip, they must be covered, flagged or marked to warn workers. If conditions become slippery, workers should take small steps with their feet pointed slightly outward to decrease the probability of slipping. Workers should watch where they are walking and plan the route to walk in areas of good stability.

4.3 TRENCHES/EXCAVATIONS

All excavations conducted on the Rocky Flats property are subject to Rocky Flats Plant Health and Safety Practice, HSP 12.08, which requires that a "Soil Disturbance Evaluation Form" be filled out for all excavation work performed in the Buffer Zone and submitted to the Rocky Flats Plant (RIP) Excavations Specialist ten (10) working days prior to the start of work. The contractor performing the excavation work will be responsible for complying with the provisions of the applicable OSHA and RIP requirements. A copy of the latest version of HSP 12.08 will be kept on site by the excavation contractor.

The excavations planned for this project will be four feet or less and therefore do not fall under the OSHA excavation regulations (29 CFR 1926.650). In addition, the trenches will be dug in an area of the Buffer Zone which was specifically selected because prior investigations¹ have indicated that there is no chemical or radiological contamination above background in the area. Therefore, no monitoring for hazardous atmospheres will be required, nor will radiological prescreening be conducted as is planned for the off-plantsite locations. However, because the excavations will be dug in the Plant Buffer Zone, EG&G still requires certain provisions be met. Those provisions include:

- A Buffer Zone Access Pass must be obtained from plant security prior to entering the Buffer Zone;
- A Rocky Flats "Soil Disturbance Evaluation Form" be filled out;
- A Land Use Request Form (RF-4427) is required to be provided to the Environmental Restoration Management (ERM) and Facilities Operations

¹See "OU1 & 2 Background Soil Sampling in Rock Creek" Report.

Management (FOM) groups at least two weeks prior to any activity in the Buffer Zone;

- A utility clearance be performed, which will be coordinated by the EG&G project manager with EG&G Construction Management. Construction Management will conduct the clearance and approve the individual locations for excavation;
- A safety inspection of the backhoe will be conducted by EG&G Safety Department (Bldg. T452B, Ext. 4165) prior to work, to authorize the backhoe for use;
- A daily inspection of the trenches will be conducted by an EG&G Construction Management Representative (Excavation Specialist), who will authorize that they are safe for entry;
- Regardless of the depth of the excavations, the excavation contractor is to have a designated, on-site Competent Person for all excavations, who will evaluate the excavation for the need for protective systems and conduct daily inspections or more frequently, as appropriate, using the checklist in Appendix 2 of EG&G's HASP 12.08;
- The backhoe will be steam cleaned by EG&G, and authorized for release at the Main Decontamination Facility prior to leaving the plantsite. The Main Decontamination Facility is located at the east end of building T-891 in the Contractor Yard (next to the 903 Pad);
- Radio communications are to be maintained with EG&G Environmental Operations Management (EOM) personnel per the instruction provided when issued the radio equipment. Radio equipment will be obtained from EOM at their field trailer. The radio will be issued at the time of the Buffer Zone Indoctrination;
- A Property Release Pass for each piece of heavy equipment brought onsite must be obtained from Radiological Engineering prior to leaving the site.

If it becomes necessary to dig any of the excavations deeper than four feet, additional preparations and authorizations from EG&G must be met prior to going deeper. In addition, and regardless of the requirements of the Rocky Flats Plant, all Dames & Moore personnel are prohibited from entering a trench or excavation that is deeper than five feet without it being properly shored, sloped, or benched in accordance with 29 CFR 1926.650.

4.4 LIFTING HAZARDS

The following guidelines will be followed whenever lifting equipment such as coolers filled with samples, generators and any other objects that are of odd size or shape or have a weight of over 50 pounds.

- Get help when lifting heavy loads. Generators will only be lifted using a two person lift.
- When moving heavy objects such as drums or containers, use a wheeled dolly or other means of assistance to move the load from one point to another.
- Plan the lift. If lifting a heavy object, plan the route and where to place the object once it has been moved. In addition, plan communication signals to be used (i.e., 1, 2, 3 lift, etc.)
- Wear sturdy shoes in good condition that supply traction when performing lifts.
- Keep your back straight and head aligned during the lift, and use your legs to lift the load - do not twist or bend from the waist and do not lift or carry objects from the side.
- Keep the heavy part of the load close to your body to keep the center of gravity more manageable.

4.5 WORK AREA PROTECTION

As the project operations may be undertaken in a roadway or parking lot, motor vehicles may be a hazard. Guidance on properly coning and flagging the work area is located in Attachment F. Consideration should be given to parking a work vehicle within the coned area between the work area and on-coming traffic.

4.6 HEAVY EQUIPMENT

Operation of heavy equipment in excavation presents potential physical hazards to personnel. The following precautions should be observed whenever heavy equipment is in use:

- Personal protective equipment (PPE) such as steel-toed boots, safety glasses or goggles, and hard hats should be worn whenever such equipment is present.
- Only qualified/certified people are to operate heavy equipment.
- Keep cabs free of all non-essential items and secure all loose items.
- Equipment operators are to report to their supervisor(s) any abnormalities such as equipment failure, oozing liquids, unusual odors, and so on.
- Vehicles may not have cracked windshields or windows, and all glass used in windshields or windows shall be safety glass.
- Blades, buckets, dump bodies, and other hydraulic systems must be fully lowered when equipment is not in use.
- Parking brakes shall be engaged when equipment is not in use.
- All vehicles with rollover protective structures (ROPS) will have seat belts; operators will be trained in the use of seat belts, and the seat belts shall be used at all times during vehicle operation.
- With certain exceptions provided in 29 CFR 1926, Subpart O, all material handling equipment will be provided with ROPS.
- Equipment with an obstructed rear view must have an audible alarm that sounds when it is operating in the reverse direction (unless a spotter guides the vehicle operator).
- Material handling equipment that lacks a ROPS must not be operated on a grade, unless the equipment can safely negotiate the grade involved.

- Heavy equipment will be inspected by the operator prior to the beginning of each work shift, and the SSR shall ensure the compliance to this regulation.
- Personnel should at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of its operation. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent.
- Traffic safety vests are required for site personnel working near mobile heavy equipment, such as backhoes and other excavators.
- Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge.
- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements.
- Keep all non-essential personnel out of the work area.

4.7 UNDERGROUND UTILITIES

Prior to the commencement of excavating activities on the Plant site (Buffer Zone), utility clearance will be performed by EG&G. The clearance will be coordinated by the EG&G project manager with EG&G Construction Management. Construction Management will conduct the clearance and approve the individual locations for excavation. The Dames & Moore SSO will obtain a copy of the clearance certification for the site log.

4.8 HAZARD COMMUNICATION

Materials which are considered hazardous materials under the OSHA Hazard Communication Standard may be used during this project for decontamination or equipment calibration purposes. In accordance with the Dames & Moore Hazard

Communication Program, the MSDSs for the hazardous materials listed below are included in Attachment E. The SSO will make copies of these MSDSs available to any subcontractors (i.e. drillers, excavators) on this project.

- Hexane (decontamination)
- Alconox (decontamination)

4.9 HEAT STRESS AND COLD STRESS

The wearing of Personal Protective Equipment (PPE) can place a hazardous waste worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, work load, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Heat stress monitoring should commence when personnel are wearing PPE, including Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (cotton coveralls) are worn, monitoring should commence at 85°F. Heat stress monitoring and control guidance can be found in Attachment D.

Protection against cold stress should be initiated when temperatures drop below 45°F. Cold stress guidance is provided in Attachment D.

4.10 NATURAL HAZARDS

4.10.1 Severe Storms

The project may be conducted during the months of the year in which severe storms occur at a higher frequency and develop rapidly. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicates an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed. While on the Rocky Flats

Plant Site, the radio issued by EG&G will be monitored by site workers for weather announcements. If hazardous weather is impending, the Plant will make an announcement for outside work to cease.

In Colorado, the months of May through August historically have the highest occurrence of death caused by lightning strikes. Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop or stand under a lone tree; seek low areas); staying away from open water, metal equipment, wire fences, and metal pipes; and spreading people out several yards apart. Remember that lightning may strike several miles from the parent cloud, so work should be stopped/restarted accordingly. If you feel your hair stand on end or smell ozone, lightning may be about to strike you. Immediately drop to your knees and bend forward - do not lie flat on the ground. Ozone has been described as having a pleasant, clover-like smell for low concentrations, and sulphur-like at higher concentrations (\approx 1ppm).

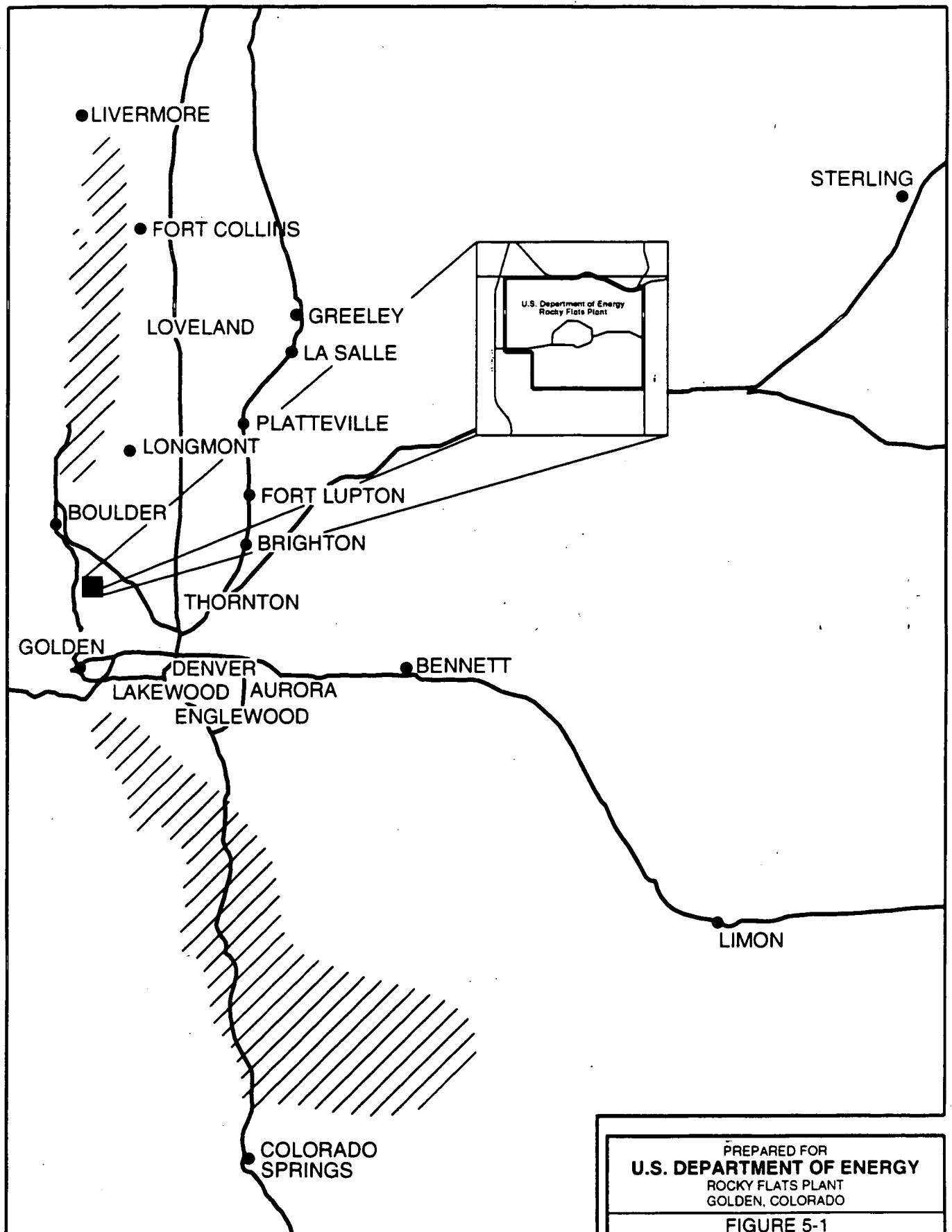
4.10.2 Biological Hazards

POISONOUS SNAKEBITES

Reactions from snakebite are aggravated by acute fear and anxiety. Other factors that affect the severity of local and general reaction from poisonous snakebite include: the amount of venom injected and the speed of absorption of venom into the victim's circulation; the size of the victim; protection from clothing, including shoes and gloves; quick antivenin therapy; and location of the bite.

First Aid Procedure

The objective of first aid is to reduce the circulation of blood through the bite area, to delay absorption of venom, to prevent aggravation of the local wound, and to sustain respiration.



PREPARED FOR
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GOLDEN, COLORADO

FIGURE 5-1

REMOTE SAMPLING REGION
FOR FALLOUT RADIONUCLIDES

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Section 4.C
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The most important step is to get the snakebite victim to the hospital quickly. Meanwhile, take the following first aid measures:

1. Keep the victim from moving around.
2. Keep the victim as calm as possible and preferably in a lying position.
3. Immobilize the bitten extremity and keep it at or below heart level. If the victim can reach a hospital within 4 to 5 hours and if no symptoms develop, no further first aid measures need be applied.
4. If mild-to-moderate symptoms develop, apply a constricting band 2 to 4 inches above the bite, but not around a joint (the elbow, knee, wrist, or ankle) and not around the head, neck, or trunk. The band should be 3/4 to 1 1/2 inches wide, not thin like a rubber band. The band should be snug but loose enough for a finger to be slipped underneath. Watch out for swelling. Loosen the band if it becomes too tight, but do not remove it. Periodically check the pulse in the extremity beyond the bite to insure that the blood flow has not stopped.

Several other factors must be considered in cases of snakebite:

- Shock. Keep the victim lying down and comfortable, and maintain his or her body temperature.
- Breathing and heartbeat. If breathing stops, give mouth-to-mouth resuscitation. If breathing stops and there is no pulse, perform cardiopulmonary resuscitation (CPR) if you have been trained to do so.
- Identifying the snake. If you can kill the snake without risk or delay, bring it to the hospital for identification, but exercise extreme caution in handling the snake.

- Cleaning the bitten area. You may wash the bitten area with soap and water and blot it dry with sterile gauze. You may apply dressings and bandages, but only for a short period of time.
- Medicine to relieve pain. Do not give the victim alcohol, sedatives, aspirin, or any medicine containing aspirin. Some painkillers, however, may be given. Consult a doctor or other medical personnel for specific medications that may be used.
- Snakebite kits. Keep a kit accessible for all outings in primitive areas or areas known or suspected to snake infested.

It is not recommended that cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy be used in the first aid treatment of snakebite.

POISONOUS INSECT BITES

Spiders

Spiders in the United States are generally harmless, with two notable exceptions: the Black Widow spider (*Latrodectus Mactans*) and the Brown Recluse or violin spider (*Lox Osceles Reclusa*).

The symptoms of a Black Widow spider bite are: slight local reaction, severe pain produced by nerve toxin, profuse sweating, nausea, painful cramps in abdominal muscles, and difficulty in breathing and speaking. Victims recover in almost all cases, but an occasional death is reported.

Field personnel should exercise caution when lifting covers off manholes, sumps, etc., since Black Widow spiders can typically be found in these areas.

Scorpions

Scorpions inject venom through a stinger in the tail. In bites from the more dangerous species, there are marked systemic effects within 1 to 2 hours. Fatalities have been recorded.

The symptoms of a scorpion sting are: excruciating pain at the site of the sting, nausea and vomiting, abdominal pain, shock, and possible development of convulsions and coma.

General First Aid for Poisonous Insect Bites:

1. Minor Bites and Stings (wasps, bees, etc.)

- Cold applications.
- Soothing lotions, such as calamine.

2. Severe Reactions

- Give artificial respiration if indicated.
- Apply a constricting band above the injection site on the victim's arm or leg (between the site and the heart). Do not apply tightly. You should be able to slip your index finger under the band when it is in place.
- Keep the affected part down, below the level of the victim's heart.
- If medical care is readily available, leave the band in place; otherwise, remove it after 30 minutes.
- Apply ice contained in a towel or plastic bag, or cold cloths, to the site of the sting or bite.
- Give home medicine, such as aspirin, for pain.
- If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he or she is not promptly relieved of symptoms, call a physician or take the victim

immediately to the nearest location where medical treatment is available. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.

- In case of a bee sting, remove and discard the stinging apparatus and venom sac.

TICKBORNE DISEASES

Lyme Disease

Lyme disease is an illness caused by a bacterium which may be transmitted by the bite of a tick (*Ixodes Dammini*), commonly referred to as the "Deer Tick". The tick is about the size of a sesame seed, as distinguished from the Dog Tick, which is significantly larger. The Deer Tick is principally found along the Atlantic coast, living in grassy and wooded areas, and feeds on mammals such as mice, shrews, birds, raccoons, opossums, deer, and humans. Not all ticks are infected with the bacterium, however. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. The various stages and symptoms of the disease are well recognized and, if detected early, can be treated with antibiotics.

Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but not firmly, until it releases its hold on the skin. Save the tick in a jar labelled with the date, body location of the bite, and the place where it may have been acquired. Wipe the bite thoroughly with an antiseptic and seek medical attention as soon as possible.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash, which develops a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage treatment by a physician is usually effective; but, if left alone, these early symptoms may disappear and more

serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems which may occur include meningitis and neurological and cardiac abnormalities. It is important to note that some people do not get the characteristic rash but progress directly to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

When in an area suspected of harboring ticks (grassy, bushy, or woodland area) the following precautions can minimize the chances of being bitten by a tick:

1. Wear long pants and long-sleeved shirts that fit tightly at the ankles and wrists.
2. Wear light colored clothing so ticks can be easily spotted.
3. Wearing tick repellents may be useful.
4. Inspect clothing frequently while in tick habitat.
5. Inspect your head and body thoroughly when you return from the field.
6. Remove any attached ticks by tugging with tweezers where the tick's mouth parts enter the skin. Do not squeeze or crush it.

Other Tickborne Diseases

Ticks transmit several other diseases, most of which are rare and occur only in specific areas.

POISONOUS PLANTS

Characteristic Reactions

The majority of skin reactions following contact with offending plants are allergic in nature and are characterized by general symptoms of headache and fever, itching, redness, and a rash.

Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Oak and Poison Sumac. The most distinctive features of poison ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim can also develop a high fever and become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

First Aid Procedure

1. Remove clothing contaminated with plant oils.
2. Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
3. Apply calamine or other soothing skin lotion if the rash is mild.
4. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

4.10.3 Plant-related Hazards

The survey area is populated with cactus, yucca, and other succulents featuring natural defense systems such as thorns of various sizes, shapes and orientations. Where possible, sampling sites should be located in an area that is relatively free of such plants. Site personnel should avoid contact with the plants, such as touching the thorns to see if they are sharp, or sitting on cacti; results of such contact are generally both painful and embarrassing.

4.11 TASK SPECIFIC HAZARD ANALYSIS

The soil sampling tasks associated with this project have been evaluated for the hazards described in Sections 4.1 through 4.10. The hazards most likely to be encountered by personnel performing the soil sampling tasks include walking and working surfaces (4.2), heavy equipment (4.6), heat stress (4.9), and natural

hazards (4.10). Site-specific health and safety briefings will address those hazards and site personnel will be reminded to follow the provisions in this HSP regarding the avoidance and/or mitigation of these hazards.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Minimum Protective Equipment for Site Personnel (all field tasks):

- Hardhat (when around heavy equipment or overhead hazards)
- Safety glasses with side shields
- Steel-toed boots with leather or rubber uppers
- Work Gloves (leather or cotton)
- Cotton coveralls

6.0 SAFE WORK PRACTICES

1. Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the vicinity of chemical use. Smoking is prohibited in the Rocky Flats Plant Buffer Zone at all times.
2. Personnel should wash their hands and face thoroughly with soap and water prior to eating, drinking or smoking.
3. All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved (i.e., presence of strong, irritating or nauseating odors).
4. Only those vehicles and equipment required to complete work tasks should be permitted within the work area.
5. Field crew members shall be familiar with the physical characteristics of site operations, including:
 - Weather conditions;
 - Accessibility to equipment and vehicles;
 - Communications;
 - Site access; and
 - Nearest water sources.
6. All wastes generated during Dames & Moore and/or subcontractor activities at the site will be disposed of as directed by the PM.
7. All personal protective equipment will be used as specified and required.
8. The buddy system will be used at all times when working in remote areas.

7.0 EMERGENCY RESPONSE PLAN

During emergencies, it is Dames & Moore's policy to summon outside assistance from agencies with personnel trained to deal with the specific emergency. This section outlines the procedures to be followed by Dames & Moore personnel in the event of a site emergency. These procedures are to be reviewed during the onsite safety briefings conducted by the SSO.

In the event of a fire or medical emergency, the following numbers can be called for assistance:

WHEN OFFSITE:

Fire: 911
Ambulance: 911
Police: 911

WHEN IN SECURITY BUFFER ZONE:

1) Request assistance over EG&G-issued radio

-OR-

2) Call:

Fire: 966-2911
Ambulance: 966-2911
Police: 966-2911

7.1 COMMUNICATION

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. Where phone service is not readily available, radios or portable phones should be used to communicate with outside agencies. Site personnel should be trained on the use of the site emergency communication network. Emergency phone numbers should be posted at the phone or radio used for outside communication. The SSO is responsible for establishing the communication network prior to the start of work, and for explaining it to all site personnel during the site safety briefing.

When working in the Buffer Zone of the Plant, radio communications are to be maintained with EG&G Environmental Operations Management (EOM) personnel. Radio equipment will be issued by EG&G. It will be obtained from EOM at the time of the Buffer Zone Indoctrination.

7.2 EMERGENCY RESPONSE PROCEDURES

7.2.1 Emergency Response Team

The emergency response team will consist of employees who assume the following roles:

- Emergency Care Provider/s

Provide first aid/CPR as needed.

- Communicator

The role of the communicator is to maintain contact with appropriate emergency services, providing as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator should be located as close to the scene as possible in order to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.

- Site Supervisor

The site supervisor (usually the SSO) should survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing damaged equipment, documenting the incident, and notifying appropriate personnel/agencies described under incident reporting. It also includes reviewing and revising site safety and contingency plans as necessary.

7.3 MEDICAL EMERGENCY RESPONSE PLAN

Prior to engaging in field activities, the SSO is to identify the hospital (see Attachment G) and route nearest to each of the sampling locations. When working in the Rocky Flats Buffer Zone, the nearest emergency services are at the Plant and are to be summoned by the means listed above. At least one employee on site will hold a current certificate in American Red Cross Standard First Aid. This training provides four hours of Adult CPR and four hours of Basic First Aid. If a medical emergency exists consult the emergency phone number list and request an ambulance immediately. Perform First Aid/CPR as necessary, stabilize the injured, and extricate only if the environment they are in is dangerous or unsafe and ONLY if the rescuers are appropriately protected for potential hazards they may encounter during the rescue. When emergency services personnel arrive, communicate all first aid activities that have occurred. Transfer responsibility for care of the injured/ill to the emergency services personnel.

The following items and emergency response equipment will be located within easy access at all times:

- First Aid Kit;
- American Red Cross Standard First Aid Manual;
- Eyewash - A 15 minute eyewash or an appropriate amount of portable sterile eyewash bottles will be available on site for flushing foreign particles out of eyes. The SSO will demonstrate the proper operation of the unit(s) prior to the start of work;
- Emergency Phone Numbers List; and
- Portable telephone or radio for emergency communications in remote areas.

7.4 INCIDENT REPORT

ALL site injuries and illnesses must be reported to the SSO and PM immediately following first-aid treatment. The SSO will also notify the DHSM (John Danby-Sacramento). Work is to be stopped until the PM or SSO and DHSM have determined the cause of the incident and have taken the appropriate action to prevent a reoccurrence. Any injury or illness, regardless of severity, is to be reported to the DHSM on the accident report form (see Attachments).

The Rocky Flats Plant requires that all occupational injuries and illnesses, motor vehicle accidents resulting in more than \$500 damage or personal injury, and property damage incidents or fires resulting in \$1000 or more in damage are to be immediately reported and investigated. DOE Form 5484.X (Attachment B) must be filled out and submitted to EG&G Occupational Safety within 24 hours of occurrence.

7.5 OPERATION SHUTDOWN

Under certain extreme hazardous situations the onsite geologist, SSO or SSR may request that site operations be temporarily suspended while the underlying hazard is corrected or controlled. During operation shutdown, all personnel will be required to stand clear of the hazard. The SSO will have ultimate authority for operations shutdown and restart.

8.0 TRAINING AND MEDICAL SURVEILLANCE

All Dames & Moore site personnel will have met the requirements of 29 CFR 1910.95 (Hearing Conservation Standard) and 29 CFR 1926.21 (construction safety training pertinent to the hazards which may be encountered) prior to engaging in excavation activities.

Prior to the start of operations at the site, the SSO will conduct a site safety briefing, which will include all personnel involved in site operations. At this meeting, the SSO will discuss:

- Contents of this HASP;
- Types of hazards at the site and means for minimizing exposure to them;
- The type of monitoring that will be performed;
- Personal protective equipment that will be used;
- Site control measures, including safe operating practices and communication;
- Location and use of emergency equipment;
- Location of and directions to nearest hospital (see Attachment G); and
- Emergency procedures.

Subsequent site safety briefings will be conducted prior to each shift to review pertinent safety issues, discuss any problems, and outline safety aspects of the shift's tasks.

For each briefing, the SSO will complete a Site Safety Briefing form (see Attachment C) and submit each on a regular basis to the DHSM.

9.0 RECORDKEEPING

The PM and SSO are responsible for site recordkeeping. Prior to the start of work, they will review this plan; if there are no changes to be made, they will sign the approval form and forward a copy to the DHSM.

All D&M personnel will review the HASP and sign the plan acceptance form in Attachment A; copies of these forms will be forwarded to the DHSM.

The SSO will conduct a Site Safety Briefing in accordance with Section 8.0 prior to each shift and have all attendees sign the form in Attachment C; copies will be forwarded to the DHSM.

Any accident or exposure incident will be investigated and the forms in Attachment B will be completed and forwarded to the office administrative manager, the DHSM, and EG&G Occupational Safety, as applicable.

ATTACHMENT A

SAFETY PLAN COMPLIANCE AGREEMENT

ATTACHMENT A

SAFETY PLAN COMPLIANCE AGREEMENT
FOR
ROCKY FLATS
BACKGROUND SOILS CHARACTERIZATION

I, _____, have received a copy of the Health and Safety Plan for the Project. I have reviewed the plan, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the plan.

SIGNED: _____

(Signature)

(Date)

Firm: _____

ATTACHMENT B

ACCIDENT REPORT FORM

Case Number _____

**OCCUPATIONAL HEALTH DEPARTMENT
ROCKY FLATS PLANT
INJURY AND ACCIDENT/ INCIDENT REPORT WORKSHEET
PERSONAL/PRIVILEGED INFORMATION**

NAME: _____ JOB TITLE: _____ COMPANY: _____

BUILDING: _____ EXTENSION: _____ EMPLOYEE/SS # _____

INJURY DATE: _____ DAY: _____ TIME: _____ TIME ON PLANTSITE: _____ Y _____ M _____ W

REPORTED DATE: _____ DAY: _____ TIME: _____ TIME ON JOB: _____ Y _____ M _____ W

LOCATION OF ACCIDENT: _____ SHIFT: _____ OT HOURS/PAST WK _____

SUPERVISOR: _____ EXT. _____ SIGNATURE: _____

PATIENT'S DESCRIPTION OF ACCIDENT: _____

PATIENT'S DESCRIPTION OF INJURY: _____

I consent to medical care by the Rocky Flats Occupational Health Department Personnel as indicated and deemed essential considering my illness/injury. I authorize the release of all medical information relevant to this injury/accident to Rocky Flats Health Services, Benefits Department, Insurance Carrier, DOE, Union, and Industrial Safety.

MEDICAL DESCRIPTION OF INJURY: _____

Employee Signature _____

OBJECT/SUBSTANCE DIRECTLY INVOLVED: _____

WEIGHT (lbs): _____

SAFETY EQUIPMENT USED: Y N

GLASSES GLOVES SHOES

OTHER: _____

LOSS OF CONSCIOUSNESS: Y N

WORK RELATED: Y P

X-RAY TAKEN: Y N

X-RAY RESULT: POS NEG

RADIA CONTAM INVOLVED: Y P

TYPE: _____

INITIAL COUNT: _____ nCi or BKG

FINAL COUNT: _____ nCi or BKG

WOUND COUNTBY: _____

RESIDUAL SKIN CONTAM Y N

INITIAL CPM: _____

FINAL CPM: _____

MONITOR SIGN: _____

BODY COUNT: _____

DTPA GIVEN: _____

BY: _____ REFUSED

WORK RESTRICTION: Y N

EST DAYS RESTRICTED: _____

SENT HOME BY MEDICAL: Y N

MEDICAL REVIEW DATE: _____

TIME SENT OFFSITE _____ (Military Time)

By: Ambulance Air

Other: _____

REFERRALS (Name/Address/Telephone) _____

ASSESSMENT/DIAGNOSIS: _____

ICD-9-CM DIAGNOSIS CODES: _____

TREATMENT AT MEDICAL: _____

TREATMENT ICD-9-CM CODES: _____

RN/EMT

Signature/Print

MD

Signature/Print

INSTRUCTIONS FOR COMPLETING DOE F5484.X

To be used for all occurrences reportable under DOE 5484.1A. Environmental Protection, Safety, and Health Protection Information. Reporting Requirements: As preliminary input for all Type A and B investigation reports, and as sufficient data for Type C accidents. Mail completed DOE F 5484.X, along with the transmittal form (DOE F 5484.Z), to SSUC, P.O. Box 1625, Idaho Falls, Idaho 83415 - Attention: CAIRS. Revisions to information on this form may be transmitted by telephone (FTS) 583-9566 or Commercial 1-208-528-9566 or by mailing a copy of the revised original to the above address.

General Information

1. Indicate the reporting organization (DOE Office or DOE contractor) that experienced the accident/incident. Also, enter the seven-character Organization Code that has been assigned to that specific reporting contractor.
2. Enter the case number. All cases for a given reporting organization will be numbered in sequences, regardless of accident type, with the first two digits representing the year; (e.g., The tenth accident in 1987 is 87010). Check the YES box to indicate a revision.
3. Multiple-case accidents are those that result in more than one recordable case (a combination of two or more persons, vehicles, or property damage cases from the same accident). Report each injury/property damage/vehicle case resulting from a single accident on a separate DOE F 5484.X, with an identical multiple-case accident number to show relationship to the common accident/incident; (e.g., If the first multiple-case accident of the year resulted in two separate employees being injured in a one-car rollover of a DOE vehicle, each injury case would be reported on a separate DOE F 5484.X and assigned sequential case numbers 87005 and 87006. The vehicle accident report would be shown on a third form as number 87007. The same multiple-case number "01" should be entered on line 4 on each of the three forms. Number each additional multiple accident sequentially).
4. Check appropriate accident type: I, P, V, or O. Include in vehicle type all transportation accidents; e.g., vehicle, aircraft, marine, and railroad. Any reportable incident other than Injury/Illness, Property Damage, or Vehicle should be reported as "Other."
5. Indicate the Investigation Type: A, B, or C. The Non-recordable box is used when a previously reported case has been revised to non-recordable status; (e.g., found to be not work-related, first-aid case only, under \$500 loss for Vehicle, under \$1,000 loss for Property Damage, etc.).
6. Enter the DEPARTMENT, DIVISION, or ID code as desired. This input field is available for structuring subgroups within a reporting organization.
7. Enter the date of accident, MMDDYY.
8. Enter the time of accident, using MILITARY time.
9. Check the appropriate box, INDOORS or OUTDOORS.
10. Check the appropriate box, on Employer's Premise, YES or NO.
11. Enter the SPECIFIC LOCATION of the accident, (e.g., Laboratory, Test Area 10, Office Area 815)

Employee Information

12. Check the appropriate box, Injured/ILL EMPLOYEE or OPERATOR of Equipment/Vehicle.
13. Enter the NAME of the employee or operator.
14. Enter the SOCIAL SECURITY number or other employee ID number.
15. Enter the AGE of employee/operator.
16. Check the appropriate box, FEMALE or MALE.
17. Enter the generic JOB TITLE, (e.g., Engineer, Welder, Security Guard, Pipe Fitter)
18. Check the appropriate box for LENGTH of EMPLOYMENT.
19. Check the appropriate box for LENGTH of JOB/EQUIPMENT EXPERIENCE.

Injury/Illness

(If "Injury/Illness" was checked in No. 4, complete this section; otherwise, proceed to No. 26.)

20. Check the appropriate box. (Reference: OSHA log). Injury code #10 or one of the illness codes 21 through 28; (Refer to the OSHA Log).
21. Enter the number of WORKDAYS LOST. If continuing, enter best estimate of expected days away.
22. Enter the number of RESTRICTED WORKDAYS. If continuing, enter best estimate of expected restricted days.
23. Check YES or NO if the accident/incident resulted in death. If YES, enter death date.
24. Check the appropriate box, YES or NO, whether transferred or terminated because of injury disability.
25. Check the appropriate box, YES or NO, whether the employee has returned to full work.

Property/Vehicle Damage

26. If "Property Damage" was checked in No. 4, indicate the appropriate box and proceed to the dollar loss section (No. 30).
27. If "Vehicle" was checked in No. 4, indicate whether the vehicle is Government-owned, or is a privately-owned vehicle driven by a Government employee. Government vehicles should include those owned, leased, or rented by the Federal Government; also any contractor-operated, privately-owned vehicles used in DOE contract work for which cost reporting to DOE is required. In addition, check the type of vehicle or conveyance involved.
28. Check the appropriate box for each question concerning SEAT BELTS.
29. Check the appropriate box, YES or NO whether the vehicle accident resulted in a recordable injury.
30. Enter the TOTAL ACCIDENT DAMAGE LOSS; separate the loss between DOE and non-DOE property or vehicle damage: (round to the nearest dollar amount).
31. Enter CLAIMS against DOE for damage to non-DOE vehicle/property; also include the amount actually paid by DOE, if and when available. Enter the dollar loss, if any, to DOE vehicles/property that should be reimbursable; also enter the amount actually paid to DOE, if and when available. Do not delay the report if exact losses are unknown. Submit a revised report to show final amounts; (round to the nearest dollar amount).
32. Check the appropriate box, YES or NO, if dollar amounts are final.

Equipment/Hardware/Vehicle Involved

33. Give the generic or brand name, model and, as applicable, the identification number of the equipment/hardware/vehicle involved. Identification should be adequate to alert others of potential hazards associated with a specific equipment model.
34. Check the appropriate box, YES or NO, if equipment design or defect contributed to the accident cause or severity.

Narrative Guide

35. Activity

What activity or assignment was in progress at the time of the accident?

Example:

- 1) Routine housekeeping duties were being performed.
- 2) No activity in facility due to extended holiday weekend.
- 3) Employee was involved in routine security inspection.

36. Events

Describe the accident, in order of sequence, beginning with the initiating event, and followed by the secondary and tertiary events. End with nature and extent of injury/damage.

Example:

- 1) Employee was pulling utility cart that was loaded with wastepaper from office area to hallway. Wheel of utility cart caught against door casing. Bags of heavy wastepaper that were in cart fell to end of cart. Cart tipped over onto foot of employee. Right foot was crushed between utility cart and door casing, resulting in severe contusion to right foot of employee.
- 2) No employee activity. HVAC system malfunctioned during long weekend. Upper floor of office building became excessively hot and triggered the automatic sprinkler system. Upper office area and contents were damaged by water. Extensive cleanup required.
- 3) Employee was driving patrol car from guard station to research facility. Patrol car struck icy section of road. Employee lost control of vehicle, which skidded across road into concrete abutment on side of road. Accident resulted in damage to right front fender, tire, headlight, and grill.

37. Accident Causes

a. State the conditions that existed at the time of the accident (the specific control factors that were or may have been the direct or immediate cause or causes of the accident).

Example:

- 1) Wheel of utility cart was worn and would not roll properly. Utility cart was overloaded with wastepaper.
- 2) Thermostatic control on HVAC system had been improperly installed during recent replacement.
- 3) Road was covered with icy spots. Weather was foggy.

b. Enter the actions on the part of the employee that contributed to the occurrence of the accident/incident.

Example:

- 1) Employee overloaded the utility cart with wastepaper.
- 2) Facility maintenance had not inspected the newly installed thermostatic control
- 3) Employee exceeded safe speed on icy road, and was inattentive to hazard.

c. List the influencing factors or underlying causes, either conditions or actions or both, that contributed to the accident/incident.

Example:

- 1) Employee had not been instructed in overloading hazards.
- 2) No existing supervisory review over craft-assigned repairs.
- 3) Employee had not been trained in driving under winter conditions. Company has no driver training program.

38. Corrective Actions

a. Actions taken to prevent recurrence of accident/incident.

Example:

- 1) Wheels of utility cart were replaced with larger size wheels. All carts were inspected for safe operation. Maintenance employees were instructed in overloading hazards.
- 2) Thermostatic control was inspected and found free of defects; it was then properly rewired.
- 3) All security personnel were instructed at safety training meeting on driving under hazardous conditions.

b. Recommended corrective actions are those that are planned by line management and require time for implementation.

Example:

- 1) Provide human factors review of utility carts and other equipment purchases.
- 2) Management to review maintenance procedures and inspection process.
- 3) Driver training program will be implemented.

c. Provide implementation date for recommended corrective action.

39. Enter the signature of the accident investigator who can be contacted for follow-up, the date and the FTS or commercial telephone number, and indicate the investigator's job title.

40. Enter the name and FTS or commercial telephone number of the cognizant supervisor. This should be an individual who, by his signature, concurs in and assures corrective action implementation.

41. Enter the name and FTS or commercial telephone number of the person to contact if different from No. 39.

U.S. Department of Energy
INDIVIDUAL ACCIDENT/INCIDENT REPORT
For All Type A, B, and C Investigations
Official Use Only - Privacy Act

DOE F 5484.X

For SSDC Use Only

P.D. Accident Type: _____ Energy Flow: _____
Enter GICS: _____ Narrative: _____ FRASE Coding: _____ Revision: 1st _____ 2nd _____ 3rd _____ 4th _____

General Information

1. Reporting Organization: _____
Organization Code: _____
2. Case Number: _____ Revision: ☐ Yes ☐ No
3. Multiple Case No.: _____

6. Department, Division,
or I.D. Code (optional): _____
7. Date of Occurrence: _____
Month _____ Day _____ Year _____

4. Accident Type ☐ Injury/Illness ☐ Vehicle
☐ Property Damage ☐ Other

8. Time: _____ (Military Time)
9. Accident Occurred: ☐ Indoors ☐ Outdoors

5. Investigation Type ☐ A ☐ B ☐ C
☐ Non-Recordable

10. On Employer's Premises? ☐ Yes ☐ No
11. Specific Location: _____

Employee Information

12. Check One: ☐ Injured or Ill Employee
☐ Operator of Equipment/Vehicle

17. Occupation: _____
18. Length of Present Employment: ☐ Under 3 mos.
☐ 3-12 months ☐ Over 12 mos.
19. Experience on the job/equipment: ☐ Under 3 mos.
☐ 3-12 months ☐ Over 12 mos.

13. Name: _____
14. S.S. or ID Number: _____
15. Age: _____
16. Sex: ☐ Female ☐ Male

If Property Damage or Vehicle Accident, go to line 26

Injury/Illness (OSHA Information)	
20. <input type="checkbox"/> Injury Code (10)	21. Workdays Lost: _____
<input type="checkbox"/> Code 7a(21) Skin diseases or disorders	22. Workdays Restricted: _____
<input type="checkbox"/> Code 7b(22) Dust diseases of lungs	23. Death: <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Code 7c(23) Resp. due to toxic Agents	Month _____ Day _____ Year _____
<input type="checkbox"/> Code 7d(24) Poisoning	24. Permanent transfer because of injury disability? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Code 7e(25) Disorders - Physical agents	Terminated because of injury disability? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Code 7f(26) Disorders - Repeated trauma	25. Has Employee returned to work with no further anticipated workdays lost or restricted? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Code 7g(28) All other	

Property/Vehicle Damage

26. Property: ☐ Fire ☐ Non-Fire
(If Property Damage Accident, go to line 30)
27. Vehicle: ☐ Government
☐ Private-Driven by Government Employee
☐ Car/Pickup/Van/Motorcycle
☐ Truck (1 ton or over)
☐ Bus
☐ Other (Air, Marine, Railroad, etc.)

30. \$ _____ Total Accident Damage
\$ _____ DOE Property/Vehicle
\$ _____ Non-DOE Property/Vehicle
31. \$ _____ Claim Against DOE
\$ _____ Paid by DOE
\$ _____ Reimbursable to DOE
\$ _____ Paid to DOE

28. Was vehicle equipped with seatbelts? ☐ Yes ☐ No
If yes - Was seatbelt worn? ☐ Yes ☐ No
29. Did vehicle accident involve recordable injury? ☐ Yes ☐ No

32. Are dollar amounts final? ☐ Yes ☐ No

Equipment/Hardware/Vehicle Involved (as applicable)

33. Equipment: (Generic [or Brand] Name & Model) _____ ID Number _____
34. Did equipment design or defect contribute to the accident cause or severity? ☐ Yes ☐ No

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Continued on the following page
DO NOT WRITE IN THE SHADED AREAS

B-5

Case Number

NARRATIVE GUIDE

35. Activity in progress at the time of accident.

36. Events - Begin with initiating and end with nature and extent of injury/damage.

37. Accident Causes

a. Conditions

b. Actions

c. Factors influencing a. or b.

38. Corrective Actions (If risk is acceptable, corrective action may not be necessary)

a. Action taken

b. Actions recommended

c. To be completed by

39. Accident Investigator: _____ Date: _____ FTS Telephone _____
Job Title: ☐ Supervisor ☐ Safety Professional ☐ Other _____

40. Supervisor responsible for Corrective Action: _____ Date: _____ FTS Telephone _____

41. Accident Investigation Contact (If different from 39.) _____ FTS Telephone _____

Distribution: White - Occupational Safety, T1520 Yellow - Benefits, Work Compensation, 1520 _____

B-6

WITNESS STATEMENT FORM

Name _____ Job Title _____
Telephone No. _____ Supervisor _____
Work Location _____
Location of Accident _____
Accident time and date _____

Please fully describe the work and conditions in progress leading up to the accident (use additional paper as needed):

Please fully describe the accident sequence from start to finish (use additional paper as needed):

Note anything unusual you observed prior to or during the accident (sights, sounds, odors, etc.).

What was your role in the accident sequence?

What conditions influenced the accident (weather, time of day, equipment malfunctions, etc.)?

How did people influence the accident (actions, emergency response, etc.)?

What did you think caused the accident?

How could the accident have been prevented?

Please list other possible witnesses:

Additional comments/observations:

Signature

Time/Date

SITE SAFETY BRIEFINGS

Job Name _____ Number _____
Date _____ Start Time _____ Completed _____
Site Location _____
Type of Work (General) _____

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Chemical Hazards _____

Physical Hazards _____

Control Methods _____

Special Equipment/Techniques _____

Hazard Communication Overview _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc.) _____

ATTENDEES

Print Name

Sign Name

Meeting conducted by: _____

BRIEFSUP.FRM

ATTACHMENT D

HEAT STRESS AND COLD STRESS GUIDANCE

HEAT STRESS MONITORING AND CONTROL

SIGNS, SYMPTOMS AND FIRST AID

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by unevaporated sweat. The papules may become infected unless treated.

First Aid for Heat Rash - to prevent heat rash: shower after work, dry off thoroughly, and put on clean, dry underwear and clothes. Try to stay in a cool place after work. If, in spite of this, you develop heat rash, see your physician.

Heat Cramps are caused by heavy sweating with inadequate electrolyte replacement.

Signs and symptoms include:

- o muscle spasms, particularly in the muscles most used
- o pain in the hands, feet and abdomen

First Aid for Heat Cramps - leave the work area, and rest in a cool, shaded place. Drink one or two glasses of electrolyte replacement drink, and try to gently massage the cramped muscle. Once the spasms disappear, you may return to work; taking adequate breaks and drinking electrolyte replacement drink should prevent the cramps from returning.

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- o pale, cool, moist skin
- o heavy sweating
- o dizziness
- o nausea
- o fainting, weakness

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core

temperature may still be near normal. It is important to recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion - leave the work area immediately, go through decon and remove all chemical protective clothing. Rest in a cool, shaded place and open your clothing to allow air circulation; lay flat except when taking fluids. Drink plenty of cooled electrolyte replacement drinks. Your work is over for the day; do not attempt to return. Medical assistance should be summoned.

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

- o red, hot, usually dry skin
- o lack of or reduced perspiration
- o nausea
- o dizziness and confusion
- o strong, rapid pulse
- o coma

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY! Remove the victim from the work area, perform a gross decon, and remove all PPE. Have the victim lie down in a cool, shady area. Attempt to bring the victim's temperature down by increasing air movement (electric fan) or placing wetted sheets or towels on them. Place an ice bag on the victim's head. The victim must not be sent home or left unattended without a physician's specific order.

Heatstroke is a serious medical condition which may be fatal and calls for prompt emergency medical action. Heatstroke can rapidly progress so that it is effecting virtually all tissues and organs, including the central nervous system, liver, and kidneys. Early recognition of the disorder or its impending onset, together with appropriate treatment, reduces the fatality rate considerably as well as the extent of organ and tissue involvement. Victims must be seen by professional medical help.

HEAT STRESS PREVENTION

The best approach to avoiding heat-related illnesses is through preventative heat stress management. The site manager and site safety officer are responsible for implementing this program.

Rest areas - a relatively cool, shaded area must be provided for breaks when ambient temperatures exceed 70°F and workers are wearing chemical protective clothing (including uncoated Tyvek), or if temperatures exceed 85°F and workers are wearing "Level D" coveralls or work clothes. A car or van is an oven, not a rest area. The rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decon area so workers can take breaks without going through full decon. If shade is not available, build some: use a plastic "dining canopy", which can be obtained at sporting goods stores. This same type of canopy can be set up to shade personnel performing hand auguring in hot weather.

Liquids - encourage employees to drink cool electrolyte replacement drinks, such as Gatorade, Squench or Quik-kick (drink), frequently. Plain water is ok, but replacement drinks are preferred. OSHA prohibits a "community cup"; use paper cups. Have workers drink 16 ounces of drink before beginning work, such as in the morning and after lunch. At each break, workers should take 8-16 ounces of drink. Don't wait until you are thirsty to drink.

Discourage the use of alcohol during non-working hours, and discourage the intake of coffee during work hours, as these make heat stress control more difficult.

Acclimatization - this is the process by which your body "gets used to" hot work environments. This is achieved by slowly increasing workloads. Start at 50 percent capacity on day one, and increase by 10 percent per day; on day six, you'll be at 100 percent. You don't lose acclimatization over a weekend, but it'll start to decrease after three to four days. If you don't do hot work for a week, it is gone. You don't have to do full shift hot work to achieve or retain acclimatization; a minimum of 100 minutes of continuous hot work exposure per day is adequate.

Auxiliary Cooling - auxiliary cooling is usually obtained by providing workers with a specially-designed vest, which is worn under the protective clothing, but over any underclothing. These vests typically provide

cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.

The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement. It is reported that frozen media vest usually cool only areas immediately adjacent to the media itself. Another consideration is that they may require a dedicated freezer in which to freeze the packs (due to potential contamination), and several additional packs need to be kept on hand due to sometimes frequent change-out required over the course of a day. The added weight and bulkiness are other considerations, which can result in discomfort and a higher energy expenditure.

The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly. If the compressed air supply may be breathed by the wearer, then the air will need to be Grade D breathing air and the type of compressor will need to be properly selected.

Newer, more sophisticated tube and refrigerant systems woven into undergarments are also available. However, some of these systems may not be effective in situations where the work involves considerable motion, since bending and lifting can crimp the tubes, impeding the flow of refrigerant. These systems may also limit range of travel, since they are hooked up to a cooling/pumping device. The supplier can assist with evaluating the efficacy of using this type of system.

Auxiliary cooling should be considered when the following conditions exist:

- Ambient temperature over 80°F
- Workers wearing impermeable garments (PE Tyvek®, Saranex, Chemrel, etc.)
- It is desirable to have long workshifts with minimum interruption

When the above conditions exist, and work is performed in direct sunlight, auxiliary cooling is mandatory.

HEAT STRESS MONITORING

For field operations that are part of ongoing site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to monitor the work cycle of each site worker. There are two phases to this monitoring: initial work/rest cycle determination, and physiological monitoring. The initial work/rest cycle is used to estimate how long the first work shifts of the day should be. Physiological monitoring of each worker, via heart rate or body temperature, will establish the length of the successive work periods. This monitoring should commence when ambient (not adjusted) temperatures exceed:

- o 70°F for personnel wearing chemical protective clothing, including Tyvek® coveralls
- o 85°F for personnel wearing normal work clothes

Determination of the Initial Work/Rest Cycles

Measure the air temperature (in Fahrenheit) with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual). Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow. 100 percent sunshine - no cloud cover = 1.0; 50 percent sunshine - 50 percent cloud cover = 0.5; 0 percent sunshine - full cloud cover = 0.0.

Plug these variables into the following equation to determine the adjusted temperature:

$$T \text{ (adjusted)} = T \text{ (actual)} + (13 \times \text{fraction sunshine})$$

The equation above is based on Fahrenheit temperatures - a slightly different equation must be used when applying temperatures measured in degrees Celsius. Use the chart below to determine the length of the first work shift. At the first break, initiate the heart rate monitoring as described in the next section.

INITIAL WORK/MONITORING CYCLES

ADJUSTED TEMPERATURE	NORMAL WORK CLOTHES	PROTECTIVE CLOTHING
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Heart Rate Monitoring

Heart rate (HR) should be measured by radial pulse for 30 seconds as early as possible in the resting period, preferably immediately after decon has been completed. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work period should be further shortened by 33 percent, while the length of the rest period stays the same.

Aural Temperature Monitoring

Monitoring of body temperature can be a reliable method of evaluating a worker's status relative to heat stress, but there are drawbacks to attempting this type of monitoring in the field. Core temperature is the preferred parameter but the social and logistical impracticalities of this method render it out of the question. Oral temperature is of questionable efficacy, based on the literature and the very strict procedures under which the temperature readings must be obtained in order to be considered reliable. In recent years, however, a new device has appeared on the market which has been shown to be useful in obtaining body temperatures with relatively few social or operational drawbacks by using the ear canal as a means to obtain a reading.

The Thermoscan® instrument can obtain temperature readings in less than five seconds. The device measures temperature by taking an infrared reading of the tympanic membrane. The standard model comes with a correction factor built into the unit so that the readout is "oral-equivalent." The Professional model has two modes in which it can be used, reading out as the actual temperature of the membrane or as a "core-equivalent." Instructions for operating the standard model of the Thermoscan follow the section on heat stress prevention.

As with heart rate monitoring, the initial work-rest cycle needs to be determined using the method described above. At the first break worker temperatures are evaluated. Aural readings should be taken as soon as workers come out of the work zone. Workers having an oral-equivalent of below 99.5°F (100.4 core-equivalent) can continue work on the applicable work-rest schedule. A worker oral-equivalent temperature between 99.5°F and 100.4°F (100.4°F - 101.2°F core-equivalent) necessitates that the next work period be shortened by one-third. If a worker's temperature at any time exceeds this level, then they are to be restricted from working in impermeable work ensembles for the remainder of the day, moved to a cooler work environment, and closely monitored. Medical assistance should be sought if the worker exhibits other signs or symptoms of heat stress.

It should be noted that there exists a phenomena in which workers can exhibit no significant increase in body temperature (as measured by aural or oral means), yet be in heat distress. The phenomena occurs during the time in which the body elicits the initial response to heat stress by increasing blood flow to the skin in order to regulate temperature. This cooling mechanism results in an increased pulse rate and decreased blood pressure (see "Heat Exhaustion" section above), but not necessarily a correlating rise in measurable temperature. The literature indicate that this response is apparently more likely to occur in workers that are not acclimatized and are subjected to rapid increases in ambient temperature (i.e. - wearing impermeable suits). Because of this, aural temperature monitoring should always be accompanied by heart rate monitoring when unacclimatized workers are working in Tyvek® garments under heat stress conditions.

INSTRUCTIONS FOR USE OF THE THERMOSCAN

1. Remove the thermometer from the base unit.
2. Install the probe cover box into the base unit.
3. Install a cover on the probe by pressing the probe barrel straight down into the opened cover box until you see the cover fit securely. This automatically turns the instrument on. Pull the probe barrel straight up from the probe cover box.
4. When the unit is ready, the display will show the temperature mode selected (e.g. "-ORAL F"), and the word "READY", indicating the thermometer is ready for use.
5. The thermometer tip should be directed toward the tympanic membrane. Hold the thermometer in the right hand when taking a temperature in the right ear; hold in the left hand for a left ear temperature. With your free hand, pull the ear pinna (external portion of the ear) up and back. Approach the ear from just behind the individual, aiming approximately midway between the opposite ear and eyebrow. Place the probe securely in the individual's ear, carefully but firmly inserting as far as possible to seal the ear canal (see figure 1).

Figure 1

6. Holding the thermometer steady, depress activation button and HOLD DOWN FOR ONE SECOND, then release the activation button and the ear pinna.
7. Remove thermometer from individual's ear. Turn it toward you, read and record the temperature. The temperature will remain on display until another cover is installed. If a temperature appears to be too low, try repeating the above procedure to ensure that you have used the proper technique. If the low reading recurs, try the opposite ear. The presence of ear wax or otitis media do not significantly impact temperature readings.
8. Eject disposable probe cover by depressing eject button (figure 2). THERMOSCAN PROBE COVERS ARE INTENDED FOR SINGLE USE ONLY! Return thermometer to case/base unit. NEVER take a temperature in an ear that contains blood or purulent discharge (consult a physician if encountered).

Figure 2

COLD STRESS MONITORING AND CONTROL

Exposure to cold working conditions can result in cold stress (hypothermia) and/or injury (frostbite) to hands, feet, and head. Hypothermia can result when the core body temperature drops below 36°C (96.8°F). Lower body temperature will very likely result in dizziness, drowsiness, disorientation, slurred speech, or loss of consciousness, with possible fatal consequences. Pain in the extremities may be the first warning of danger to cold stress. Shivering develops when the body temperature has fallen to 35°C (95°F).

Hypothermia can be brought on by exposure to cold air, immersion in cold water, or a combination of both. Wind chill factor, the cooling power of moving air, is a critical factor in cold stress.

Adequate insulating clothing must be worn by workers if work is performed in temperatures below 4°C (40°F). At temperatures of 2°C (35.6°F or less), workers whose clothing becomes wet should be immediately provided with a change of clothing, and if necessary, treated for hypothermia. Treatment includes warming the victim with skin-to-skin contact, or by providing warm blankets or other coverings, and drinking warm liquids. Skin exposure should not be permitted at temperatures of -32°C (-25°F) or below.

If fine work is to be performed with bare hands for more than 10-20 minutes at temperatures below 16°C (60°F), provisions should be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F and fine manual dexterity is not required, then gloves should be worn. Metal handles of tools should be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (tents, trailers, vehicle cabs) should be made available nearby.

ATTACHMENT E

MATERIAL SAFETY DATA SHEETS



Genium Publishing Corporation

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Schenectady, NY 12304-4690 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 397

n-Hexane

Issued: 10/78

Revision: D. 9/92

Section 1. Material Identification

***n*-Hexane (CH₃(CH₂)₄CH₃)** Description: Derived by fractional distillation from petroleum (molecular sieve process). Used as a solvent for glues, cements, adhesives, fats, and oils; a lab reagent; liquid in low temperature thermometers (instead of mercury); thinner, cleaning agent; polymerization reaction medium; an alcohol denaturant; in retreading tires for determining the refraction index of minerals.
Other Designations: CAS No. 110-54-3, dipropyl, Getrysolve-B, hexyl hydride, NCI-C60571, Skellysolve-B.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*⁽⁷³⁾ for a suppliers list.

R 1
I 3
S 2*
K 3
* Skin absorption



Cautions: *n*-Hexane is highly flammable. It is irritating to the eyes, skin, and mucous membranes. Vapor inhalation produces central nervous system (CNS) depression, becoming anesthetic at high concentrations. Chronic exposure may result in polyneuropathy.

HMS
H 2†
F 3
R 0
PPE-Sec. 8
† Chronic effects

Section 2. Ingredients and Occupational Exposure Limits

n-Hexane; commercial hexane is a mixture of *n*-hexane and isomers of methyl pentane and heptane. 1 to 6% benzene may also be present.

1991 OSHA PEL

8-hr TWA: 50 ppm (180 mg/m³)

1990 IDLH Level

5000 ppm

1990 NIOSH REL

TWA: 50 ppm (180 mg/m³)

1992-93 ACGIH TLV

TWA: 50 ppm (176 mg/m³)

1990 DFG (Germany) MAK

TWA: 50 ppm (180 mg/m³)

Category II: substances with systemic effects

Half-life: < 2 hr

Peak Exposure Limit: 100 ppm, 30 min
average value, 4/shift

1985-86 Toxicity Data*

Human, inhalation, TC_{Lo}: 5000 ppm/10 min caused hallucinations and distorted perceptions.

Rat, oral, LD₅₀: 28,710 mg/kg; no toxic effect noted

Rat, inhalation, TC_{Lo}: 1000 ppm/6 hr from the 8th to 16th day of pregnancy produced effects on newborn growth.

Rabbit, eye: 10 mg caused mild irritation.

* See NIOSH, RTECS (MN9275000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 156 °F (69 °C)

Freezing Point: -139 °F (-95 °C)

Vapor Pressure: 150 mm Hg at 77 °F (25 °C)

Refraction Index: 1.37486 at 68 °F (20 °C)

Critical Temperature: 453.2 °F (234 °C)

Critical Pressure: 29.7 atm

Liquid Surface Tension: 18.4 dyne/cm

Odor Threshold: 65 ppm

Molecular Weight: 86.17

Density: 0.66 at 20/4 °C

Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.1049 lb/ft³ or 1.678 kg/m³

Water Solubility: Slightly, 0.014 mg/ml at 68 °F (20 °C)

Other Solubilities: Alcohol, acetone, chloroform, ether, and most non-polar solvents.

Ionization Potential: 10.18 eV

Viscosity: 0.334 cP at 35 °F (2 °C), 0.306 cP at 80 °F (27 °C), 0.276 cP at 145 °F (62.5 °C)

Appearance and Odor: A colorless, volatile liquid with a gasoline-like odor.

Section 4. Fire and Explosion Data

Flash Point: -7.6 °F (-22 °C)

Autoignition Temperature: 437 °F (225 °C)

LEL: 1.2% v/v

UEL: 7.5% v/v

Extinguishing Media: *n*-Hexane is a Class 1B Flammable Liquid. For small fires, use dry chemical, carbon dioxide, water spray, or regular foam. For large fires, use water spray, fog, or regular foam. Unusual Fire or Explosion Hazards: Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. *n*-Hexane poses a vapor explosion hazard indoors, outdoors, and in sewers. Burning rate = 7.3 mm/min.
Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighters' protective clothing provides only limited protection. If possible without risk, move container from fire area. Apply cooling water to sides of container until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire. Discoloration may indicate danger of BLEVE (boiling liquid expanding vapor explosion). Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: *n*-Hexane is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** Incompatible with strong oxidizers and may explode at 82.4 °F (28 °C) when mixed with dinitrogen tetroxide. **Conditions to Avoid:** Contact with heat and incompatibles.

Hazardous Products of Decomposition: Thermal oxidative decomposition of *n*-hexane can produce acrid smoke and irritating vapors.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,⁽¹⁶⁴⁾ NTP,⁽¹⁶⁹⁾ and OSHA⁽¹⁶⁴⁾ do not list *n*-hexane as a carcinogen. Although there is no data on human carcinogenicity specifically caused by *n*-hexane, there is an increase in association between Leukemia risk in the rubber industry and exposure to a variety of substances including hexane. **Summary of Risks:** Vapors are irritating to the skin, eyes, and respiratory tract. Inhalation produces varying degrees of CNS depression depending on concentration. High concentrations may lead to asphyxia (oxygen displacement). Chronic exposure (usually at least 60 to 240 ppm) results in neurotoxicity characterized by sensory loss, pain, and neurogenic atrophy of skeletal muscle. Peripheral neuropathy is mostly of the 'stocking & glove' type. *n*-Hexane is ultimately converted to 2,5-hexanedione during metabolism and is considered to be the metabolite responsible for toxicity. Evidence exists that *n*-hexane accumulates in fatty tissue which would explain its affinity for the blood, liver, and brain where lipids are prevalent. After exposure has ceased, the half-life is 64 hrs. Metabolism is inhibited by co-exposure to toluene, methylethyl ketone, or methyl *n*-butyl ketone. *n*-Hexane is absorbed through the skin in both liquid and vapor form. Therefore, dermal vapor absorption raises biological levels above those reached during inhalation of or below the TLV concentration. This is why it is imperative that protective clothing be used so that the TLV levels are sufficient to prevent over-exposure. **Medical Conditions Aggravated by Long-Term Exposure:** Skin, CNS, PNS, and respiratory diseases.
Target Organs: Eyes, skin, respiratory system, central and peripheral nervous system. **Primary Entry Routes:** Inhalation, skin contact/absorption, eyes, ingestion. **Acute Effects:** Vapor inhalation produced marked vertigo and hallucinations at 5000 ppm/10 min; drowsiness, fatigue, appetite loss, and paresthesia in the distal extremities at 1000 to 2500/12 hrs; muscle weakness, cold pulsation in extremities, blurred vision, headache, anorexia and onset of polyneuropathy at 500 to 2500 ppm (time not given).

Continue on next page

Section 6. Health Hazard Data

Skin contact causes immediate irritation with redness, painful burning and possible blisters. Eye contact produces irritation, watering, and burning. Ingestion poses a serious aspiration hazard. If aspiration into the lungs occurs, asphyxiation from oxygen displacement may lead to brain damage and cardiac arrest. Cardiac sensitization to epinephrine (the body's adrenalin) may cause rhythm disturbances with potentially fatal consequences. **Chronic Effects:** Polyneuropathy occurs from repeated exposure to levels typically in the 400 to 600 ppm range; there is a case of polyneuropathy after exposure to 54 to 200 ppm/1 year. Initial symptoms include muscle weakness, motor loss, sensation disturbances (numbness and pain without stimulus), and distal symmetric leg pain after 2 to 6 months exposure. Clinical studies indicate muscle atrophy (wasting away), foot drop, decreased muscle tone and strength, and paresthesias of the arms and legs. Vision problems including changes in color vision, retinal pigmentation, and in perifoveal capillaries were found in workers exposed to 420 to 1280 ppm for > 5 years. Progression of neuropathy may continue for several months after exposure has ceased, followed by slow recovery taking on the average of 9 to 10 months and rarely, up to 2 years. Residual spinal cord damage was noted in most severely injured victims.

FIRST AID Emergency personnel should protect against exposure

Eyes: Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. **Inhalation:** Remove exposed person to fresh air and administer supplemental oxygen as needed. Intubation may be necessary in severe cases (aspiration of liquid). **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, have that conscious and alert person drink 1 to 2 glasses of water to dilute. Do not induce vomiting because of severe aspiration hazard. If spontaneous vomiting occurs, position head to avoid aspiration of vomitus.

Note to Physicians: BEI = 2,5-hexanedione in urine, sample at end of shift at workweeks end, 5 mg/g creatine. Also measure n-hexane in expired air. Analgesics may be necessary for pain management, there is no specific antidote. Monitor arterial blood gases in cases of severe aspiration.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off ignition sources. Cleanup personnel should protect against vapor inhalation and skin/eye contact. Take up small spills with earth, sand, vermiculite, or other absorbent, noncombustible material and place in suitable containers. Dike far ahead of spill for later disposal or reclamation. For water spills, use oil skimming equipment to lift spill. Absorbent foams can be applied to slick. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Degradation:** If released on soil, n-hexane will readily volatilize from moist surfaces although some may absorb to soil. In water, n-hexane will volatilize rapidly although some will absorb to sediment. The log bioconcentration factor (log BCF) estimated at 2.24 to 2.89 suggests bioconcentration is not an important factor in aquatic systems. The estimated Koc of 1250 to 4100 indicates that n-hexane absorbs to carbon/organic matter. Volatilization half-life from a model river is 2.7 hr at 77 °F (25 °C), 1 meter deep flowing at 1m/sec with a 3 m/sec wind speed. Volatilization from a model pond (which considers effect of absorption) is estimated at 6.8 days. In the atmosphere, it is expected to exist entirely in the vapor phase. It does not absorb UV light in the environmentally significant range (> 290 nm). It reacts with photochemically produced hydroxyl radicals. Estimated lifetime under photochemical smog conditions is 5.9 hr (SE England). **Disposal:** Spray into an incinerator (may burn quicker by addition of another flammable solvent). Evaporation in a suitable hood may be used for smaller amounts. Landfill is not recommended. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

Listed as a RCRA Hazardous Waste (40 CFR 261.21): D001, Characteristic of ignitability

Listed as 'Unlisted hazardous Waste, Characteristic of ignitability' a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 100 lb (45.4 kg) [* per RCRA, Sec. 3001]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 500 ppm, use a supplied-air respirator (SAR) or SCBA. For < 1250 ppm, use a SAR operated in continuous-flow mode. For 2500 ppm, use a SAR with a tight-fitting facepiece operated in continuous-flow mode or a SCBA with a full facepiece. For < 5000 ppm, use a SAR operated pressure demand or other positive-pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets made of nitrile, Viton, polyvinyl chloride, or chlorinated polyethylene to prevent skin contact. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾ **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in a cool, dry, well-ventilated area away from heat, ignition sources, and incompatibles (Sec. 5).

Engineering Controls: To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Purge all vessels previously containing n-hexane with steam before entering for the purpose of repair (cutting, welding). Refer to OSHA's Confined Space Standard (29 CFR 1910.119). **Administrative Controls:** Consider preplacement and periodic medical exams of exposed workers that emphasize the central and peripheral nervous systems, skin, eyes, and respiratory system.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Hexanes

DOT Hazard Class: 3

ID No.: UN1208

DOT Packing Group: II

DOT Label: Flammable Liquid

Special Provisions (172.102): T8

Packaging Authorizations

a) Exceptions: 173.150

b) Non-bulk Packaging: 173.202

c) Bulk Packaging: 173.242

Quantity Limitations

a) Passenger Aircraft or Railcar: 5L

b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements

a) Vessel Stowage: E

b) Other:

MSDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 133, 139, 140, 148, 149, 153, 159, 162, 163, 164, 167, 168, 171, 174

Prepared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, MPH, CIH; Medical Review: W Silverman, MD

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MATERIAL SAFETY DATA SHEET

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No. 43

TRISODIUM PHOSPHATE
DODECAHYDRATE

Date November 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: TRISODIUM PHOSPHATE DODECAHYDRATE

DESCRIPTION: Crystallizes from water as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ and can exist as several hydrate forms, depending on processing, and as the anhydrous salt.

OTHER DESIGNATIONS: TSP, Trisodium Orthophosphate, Sodium Phosphate, Tribasic, Tertiary Sodium Phosphate, GE Material D4K1, ASTM D538, CAS# 007 601 549

MANUFACTURER: Available from several suppliers, including FMC Corporation, Monsanto Co., Stauffer Chemical Co., and Olin Corp.

SECTION II. INGREDIENTS AND HAZARDS

Trisodium Phosphate (as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)

%

> 97

HAZARD DATA

No TLV established*

*Under OSHA inert dust limits it can be assumed that air-borne particulate, not otherwise controlled, is limited to a maximum of 5 mg/kg of respirable dust; however, this level may not be adequate to prevent irritation with this material.

($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)
Rat, Oral
LD₅₀ 7400 mg/kg

SECTION III. PHYSICAL DATA

Boiling point ----- $-11 \text{ H}_2\text{O}$ at 100 C Specific gravity (20/4 C) ----- 1.62
(decomposes) - pH of 1% water solution at 25 C - ca 12
Melting point, deg C -- >73.3 (dec) Molecular weight ----- 380.1
Solubility, g/100g H_2O :
at 0 C ----- 1.5
at 15 C ----- 28.3 Appearance & Odor: White or colorless crystalline
at 70 C ----- 157 solid (also as powder flake, granules, etc.).
No odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
None	None	None		

Extinguishing Media: Use that which is appropriate to the surrounding fire; this material is non-combustible.

In a fire situation at high temperature phosphates can emit highly toxic phosphorus oxide fumes. Firefighters should use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This material is a stable alkaline solid at room temperature. It does not undergo hazardous polymerization.

It is incompatible with acidic materials.

SECTION VI. HEALTH HAZARD INFORMATION

TLV None established (See Sect II)

This alkaline material will cause irritation to the respiratory tract if inhaled as a dust or as a solution mist. Prolonged or repeated skin contact will irritate the skin. Eye contact will irritate and can damage the eyes (alkaline attack). This material is low in toxicity by ingestion, but its alkaline nature will irritate, injure the digestive tract. (Trisodium phosphate is used as a food additive; but it must be reduced in alkalinity before being taken into the body.)

FIRST AID:

Eye contact: Promptly flush with plenty of water for 15 minutes. Get medical help.

Skin contact: Wash well with soap and water; rinse well with water. If irritation persists, get medical help.

Inhalation: Remove to fresh air. Get medical help if irritation persists.

Ingestion: Give 1-2 glasses of water or milk to drink to dilute; then give fruit juice or diluted vinegar to drink. Do not induce vomiting! Immediately contact a physician.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

For large spills, notify safety personnel. Clean-up personnel should use protection against contact or inhalation of dust or mist. Scoop up spill for recovery or disposal and place in a container with a lid. Flush residues to the sewer with plenty of water.

DISPOSAL: Scrap material can be used for neutralizing acidic wastes, or it can be buried in an approved manner in an approved landfill. Small amounts can be flushed to the sewer if regulations permit. Follow Federal, State and local regulations for disposal.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general ventilation to the workplace; if dusting conditions occur, local exhaust ventilation will be needed and a NIOSH approved dust respirator may be required.

The use of rubber or plastic gloves and chemical safety glasses with side shields is recommended for handling this material. An apron may also be desirable to prevent contact with clothing, especially where solutions are involved.

Provide eyewash station near to the workplace where this material is used; a safety shower may also be needed where large amounts of solution are prepared or used.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store this material in tightly sealed containers in a clean, dry, ventilated area. Prevent physical damage to containers.

Avoid contact with the body and inhalation of dust.

Note that anhydrous trisodium phosphate and lower hydrates are more alkaline on a weight basis than $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$.

DATA SOURCE(S) CODE: 1,2,4-7,12,15

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APPROVALS: MIS, CRD

Industrial Hygiene
and SafetyCorporate Medical
Staff

GENIUM PUBLISHING

WORK AREA PROTECTION GUIDANCE

CORRECT USE OF WORK AREA PROTECTION EQUIPMENT

1. High Level Warning

High Level Warning should be the first protection equipment to be placed in position. This will provide a degree of protection during positioning of the other equipment. Always start with the Advanced Warning and work back to the job site, establishing the guidance pattern and placing signs. The table below should be used only as a guide. Conditions will vary with type of operation and location.

Speed of Traffic	Distance from Work Site (High Level Warning)
25 or below*	-150 feet
35	250 feet
45	500 feet
55	750 feet
60	1500 feet
Expressway	1/2 Mile or More

* In heavily congested traffic areas, with slow moving vehicles, such as a downtown area, it may be advisable to place the high-level warning at the work area.

A good rule of thumb for placing the initial warning sign ahead of the work area is--the further the better the protection. Each situation will differ as in the case of hills and curves. Consideration should always be given, depending on the situation, for the use of Flagman.

2. Traffic Cones

Traffic cones create an excellent guidance path for the motorist when they are correctly positioned. Too many cones, cones in a soiled condition or improperly positioned cones only increase the hazard through confusion. Cones should only be used for guiding and channeling traffic. Keep them clean, visible and in good repair.

From the Advanced High Level Warning Device to the job site, cones should be positioned so as to effect a guidance path similar to that which is accomplished through striping, to direct vehicles into a Left Turn Lane. If cones are SPACED CORRECTLY with relation to speed to traffic, they will produce the same effect as a solid line to the approaching motorist.

The following table gives suggested distances for the spacing of Traffic Cones.

Miles per Hour	Distance in Feet
up to 30 mph	10 - 20 feet
30 - 45 mph	25 - 35 feet
45 - 55 mph	40 - 50 feet
55 and over	55 - 60 feet

3. Barricades

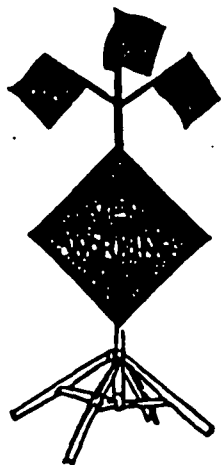
The generally accepted method is to place Barricades at right angles to the direction to the approaching traffic. They should be highly visible in themselves. There are many approved uses for Barricades and there are many variations in shapes and sizes. Refer to "Manual on Uniform Traffic Control Devices."

4. Flasher Warning Lights

The most EFFECTIVE Flasher Warning Lights are those which incorporate the following:

- 7" diameter lens
- Transistor circuit
- Incandescent bulb
- Percentage Dwell--22-28%
- Flash Rate (approximately 70 fpm)

HIGH LEVEL WARNING PROTECTION



Advanced "High Level Warning" for daytime use

Easily assembled, 3 red flags—
with stabilizing weights and wind
spilling devices—the standard will
withstand high winds without
turning or toppling.

E-3 of 3



Advanced "High Level Warning" for night use

Three 7" diameter flashing amber
lights. Battery operated—when
positioned properly flasher warning
lights create an excellent warning.

TABLE A
**SUGGESTED SPACING OF HIGH LEVEL ADVANCED WARNING
RELATED TO SPEED OF TRAFFIC**

Speed of Traffic	Lane Closure	Low Level Guidance Traffic Cone Spacing	High Level Warning Sign to Work Site	Sign Legend	Sign Size
25 mph or below	No	10'	150'	Men Working	30" x 30"
35 mph	No	35'	250'	Men Working	30" x 30"
45 mph	No	45'	500'	Men Working	30" x 30"
	Yes	45'	1st Sign 500' 2nd Sign 150'	Right or Left Lane Closed Ahead Men Working	48" x 48" 30" x 30"
55 mph	No	55'	750'	Men Working	30" x 30"
	Yes	55'	1st Sign 750' 2nd Sign 150'	Right or Left Lane Closed Ahead Men Working	48" x 48" 30" x 30"
FREEWAY	No	65'	1st Sign 2500'	Men Working	48" x 48"
			2nd Sign 1500'	Men Working	48" x 48"
			3rd Sign 1000'	Men Working	48" x 48"
			4th Sign 500'	Men Working	48" x 48"
			5th Sign 150'	Men Working	30" x 30"
FREEWAY	Yes	65'	1st Sign 2500' +	Right or Left Lane Closed Ahead	48" x 48"
			2nd Sign 1500'	Right or Left Lane Closed Ahead	48" x 48"
			3rd Sign 1000'	Right or Left Lane Closed Ahead	48" x 48"
			4th Sign 500'	Right or Left Lane Closed Ahead	48" x 48"
			5th Sign 150'	Men Working	30" x 30"

NOTE: Freeway with median — repeat signing on median.

Lane Closure — repeat in opposite direction if guidance path affected.

ATTACHMENT G

AREA HOSPITALS

Area Hospitals and Treatment Facilities

Rocky Flats Plant Area: RFP Occupational Health Department
Building 122
Central Avenue and Third Street
966-2594

Boulder Area: Boulder Community Hospital
1100 Balsam Avenue
440-2273

Colorado Springs Area: Memorial Hospital
1400 E. Boulder
475-5000

Fort Collins Area: Poudre Valley Hospital
1024 Lemay
495-7000

Lakewood Area: Swedish Medical Center
501 E. Hampden Avenue
788-5000

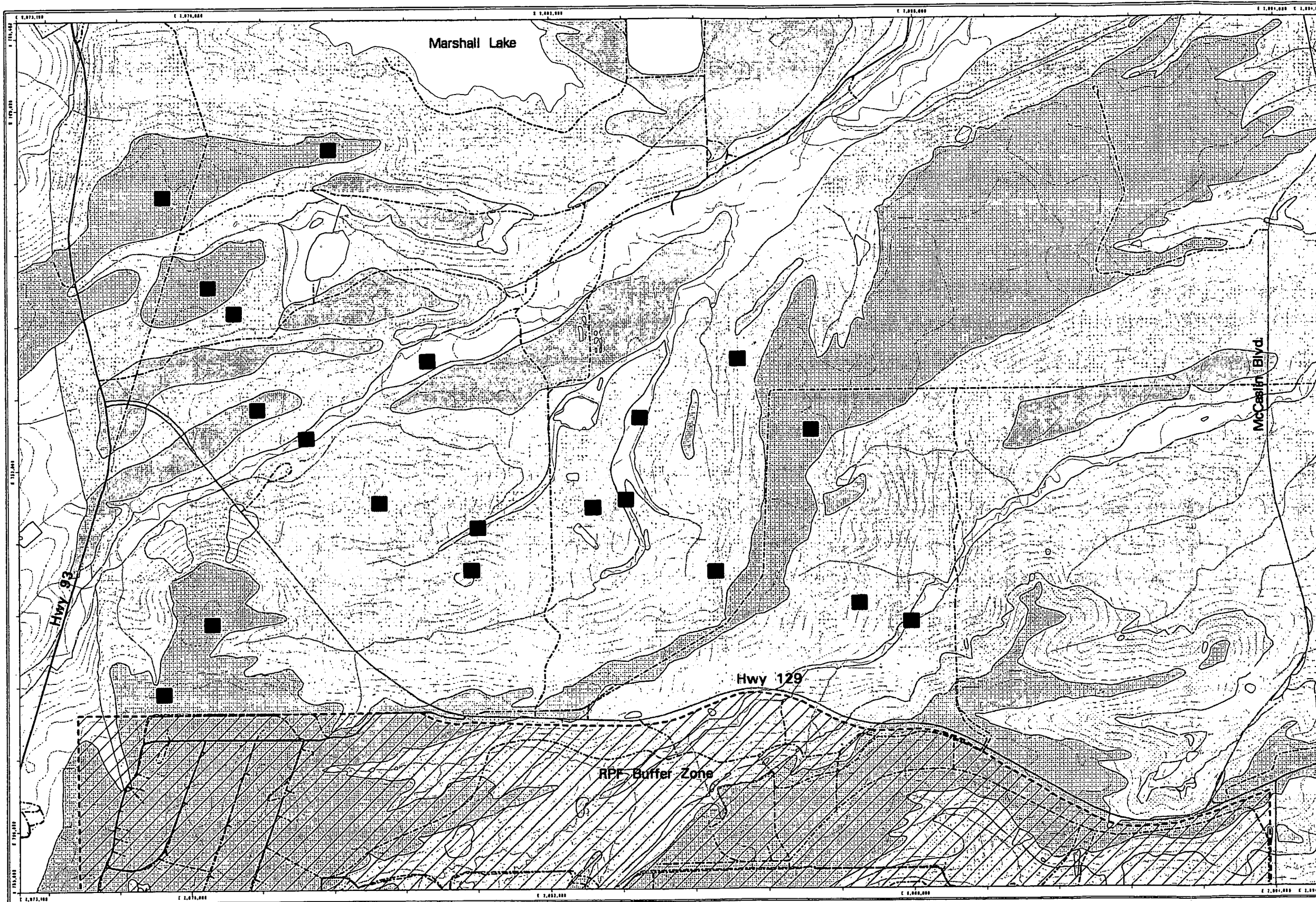
Littleton Area: Littleton Hospital
7700 S. Broadway
730-8900

ATTACHMENT H .

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
analyzer	refers to the field instrument
atm	atmosphere
°C	centigrade
Carcinogen	A substance that can cause cancer
cc	cubic centimeter
CGI	Combustible Gas Indicator
CNS	Central Nervous System
DHSM	Division Health and Safety Manager
eV	Electron volts
EPA	U.S. Environmental Protection Agency
°F	fahrenheit
HSP	Health and Safety Plan
kg	kilogram
LEL	Lower Explosive Limit
Lpm	liter per minute
MSDS	Material Safety Data Sheet
m	meter
mg	milligram
mg/M ³	milligram per cubic meter
ml	milliliter
mm	millimeter
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
OBZ	Operator's Breathing Zone
OEL	Occupational Exposure Limit
OSC	Office Safety Coordinator
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer (Foxboro-Century)
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
ppb	parts per billion
ppm	parts per million
REL	Recommended Exposure Limit
SSO	Site Safety Officer
SSR	Subcontractor's Safety Representative
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
UEL	Upper Explosive Limit
VOC	Volatile Organic Compound

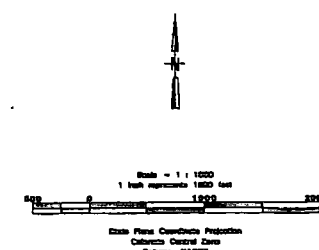


BACKGROUND SOILS **Geology Basemap** **and** **Sampling Locations** **Metals / Uranium / Organics**

GEOLOGY/SOIL UNITS

- Qrl - Rocky Flats Alluvium/ Piedmont Soils
- Kt - Laramie Formation / Valley Slope Soils
- Qs - Valley-fill Alluvium/ Drainage Bottom Soils
- Ka - Archapoo Formation/ Valley Slope Soils
- Qta - Terrace Alluvium/ Valley Slope Soils
- Qls - Landslide Slump/ Valley Slope Soils

PROPOSED SAMPLE LOCATIONS



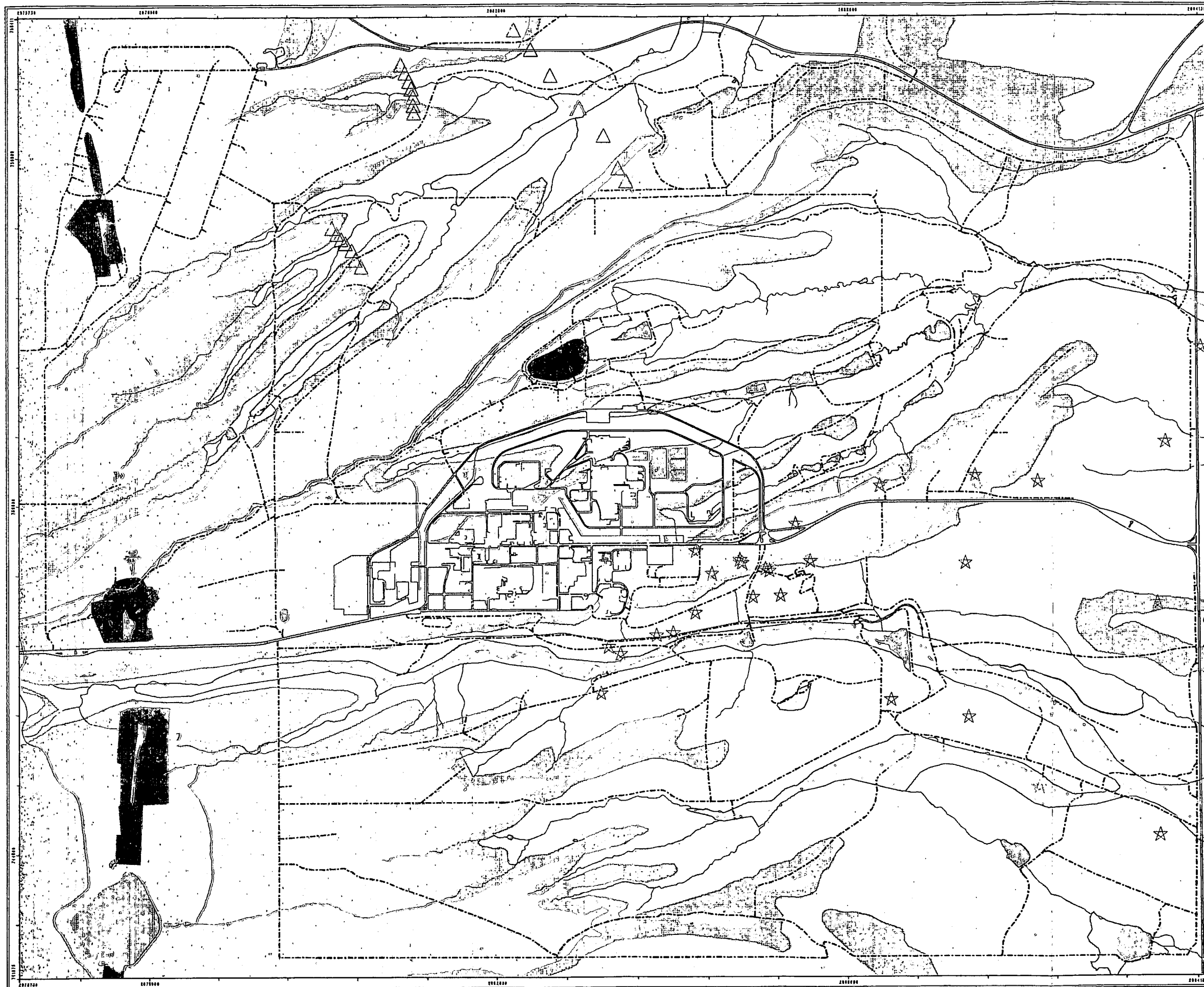
U.S. Department of Energy
 Rocky Flats Plant

Prepared by:
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REVISION NO.	DATE	BY / REVISION	REV
None Assigned	04/08/84	UK, Hoyer ERM/02	04/08/84
*** Draft ***		Checked	
		Approved	
APPROVED		Jm. Winding ERM/02	
April 08, 1984			

FIGURE 5-3

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U.S. Department of Energy
Rocky Flats Plant

SOIL TAXONOMIC GREAT GROUPS

- t, mont Argiustolls and similar
- c-sk, mont, mesic, Aridic, Paleustolls
- Torrifluvents, Haplaquolls, and similar
- l-sk, Aridic Argiustolls and similar
- Pits, gravel
- Rock outcrop, Sedimentary

PIT LOCATIONS

- ☆ PREVIOUS STUDIES
- △ PROPOSED PROFILES



Scale = 1 : 20180
1 inch = 1680 feet



State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

Prepared by:

EG&G ROCKY FLATS

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Date: April 05, 1984

FIGURE 5-5
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